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Agricultural Extension Service

B. W. KILGORE, Director

TOBACCO CURING BARNS

Curing Barn at the Granville Test Farm, Oxford, N. C.

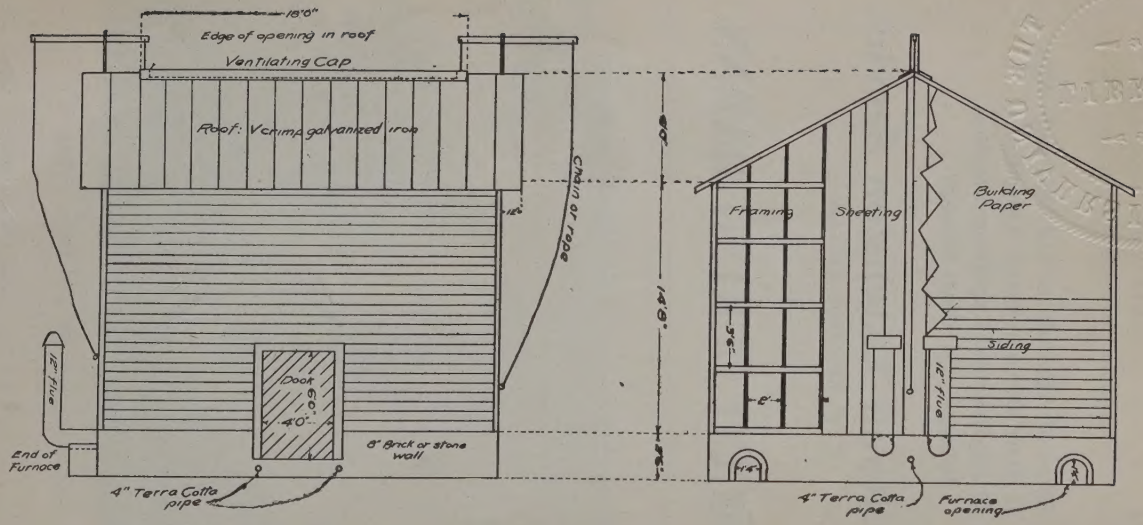

Figure 1—Front Elevation of Curing Barn.

TOBACCO CURING BARNS

GIVING AN

Improved Method of Construction and Ventilation

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Assistant in Tobacco Investigations.

Little has been done in recent years towards the improvement in construction of the tobacco barn used in the flue-cured districts, and this is particularly true with reference to adequate means of ventilation.

In a recent bulletin on tobacco curing, W. W. Garner* says: "The principal use of the artificial heat is to regulate the humidity, and evidently this is affected by the amount of water in the tobacco and the prevailing weather conditions.

"The capacity of the air for holding moisture, and consequently its drying capacity, depends principally on its temperature, and air which is already saturated has no drying power until its temperature is raised. In order to control the rate of drying, the temperature in the barn must bear a certain relation to that of the outside air, and the correct difference in temperature inside and outside the barn will be influenced by the humidity of the outside air. In warm weather the temperature inside the barn must be higher than in cool weather, and in rainy or wet seasons it must be higher than in dry weather.

"In addition to temperature there is another equally important factor in controlling the humidity in the barn; this is ventilation. The warm, moist air in the barn must be constantly replaced by the less humid outside air; hence, proper means of ventilation should be provided. Few growers fully appreciate the importance of ventilation. Most barns are built without satisfactory provision for ventilation, and the only reason that curing can be successfully done in these cases is that the barns are not sufficiently tight to prevent the natural ventilation caused by the higher temperatures within. Frequently this natural ventilation is insufficient, and at the critical moment the tobacco is badly damaged by discoloration because of the excessive moisture. On the other hand, it is desirable to check the rate of drying so that it is important to provide ventilators at the top and bottom of the barn which can be readily opened or closed as desired."

In 1911 an experiment in curing was begun, the objects being to determine whether more uniform cures, considering weather conditions

*"Tobacco Curing," Farmers' Bulletin 523, U. S. Department of Agriculture.

NOTE.—In accordance with an agreement between the North Carolina Experiment Station and the United States Department of Agriculture, the Federal Department has for several years co-operated in the conducting of tobacco experiments at the Granville Test Farm. This circular has been prepared under this agreement.

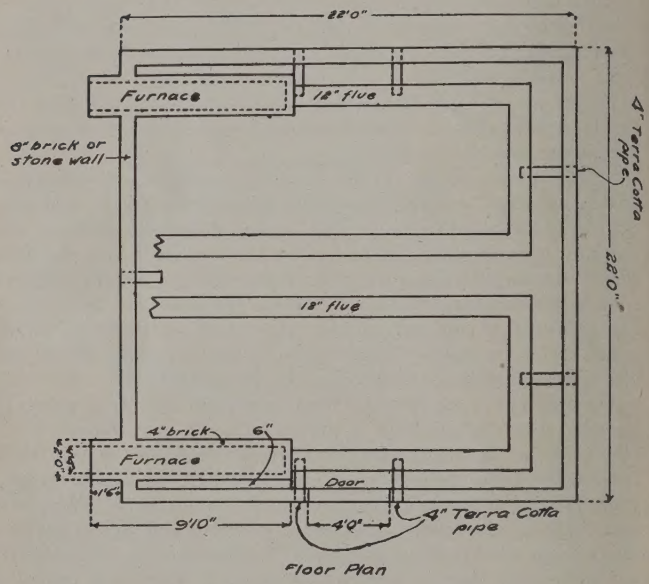

Figure 2—Drawing Showing Floor Plan of Tobacco Curing Barn

and varying amounts of water (commonly spoken of as sap) in the tobacco at the time of curing, could not be made; and whether the fuel consumption could not be materially reduced by using tight barns fitted with proper ventilators so placed in the barn as to keep a current of air circulating through the tobacco when needed.

For this experiment two 18 feet log barns were used. On one of these the old roof was replaced by a tight cover of galvanized V-crimp iron. Between the sheeting one-inch strips were nailed to prevent air escaping around the eaves of the roof. The barn was daubed inside and out, so as to make it as nearly air-tight as was practical. Seven 4-inch pieces of terra cotta pipe 2 feet long were placed in the underpinning of the barn, the bell of the pipe being flush with the outside of the barn, and extending inside the barn and delivering the air either under or against the sheet iron pipes used as flues, as shown in figure 2. By this means the air is slightly heated before coming in contact with the tobacco, and consequently more quickly absorbs the moisture from the green tobacco. A type of inverted trough ventilator, devised by Mr. E. H. Mathewson, in charge of the co-operative tobacco investigations at Reidsville, was placed on top of the barn, as shown in detail in figure 3 (also shown in use on the barn in figure 4). This ventilator is easily and cheaply constructed and can be raised or lowered at either end by means of a wire or chain dropped from end of lever on outside of barn, thus largely controlling the circulation of the air through the tobacco. If perchance one-half of the barn is filled with heavier tobacco than the other half, the air currents can be forced to travel through the heavier tobacco. This equipment is not offered, of course, as a means of always obtaining uniform cures with tobacco of different sizes and stages of ripeness, but it will be of considerable assistance in curing mixed lots as is often necessary in finishing up the crop.

In these experiments the second barn, which was used for comparison, was covered with boards, was well daubed outside, and fitted with the same size furnaces and flues as the tight barn. Each of these barns would hold about 400 sticks of cut tobacco.

The following table gives the results obtained during the two years these barns were used in the experiments:

TABLE—RESULTS OF CURING EXPERIMENTS.

OLD BARN

	Weather Conditions	Amount Wood Required for Curing	Grade of Cures
1911	Good	1¼ Cords	Good
1911	Cold and Raining	1½ Cords	Medium
1912	Good	1¼ Cords	Good
1912	Good, Cold Nights	1⅜ Cords	Good

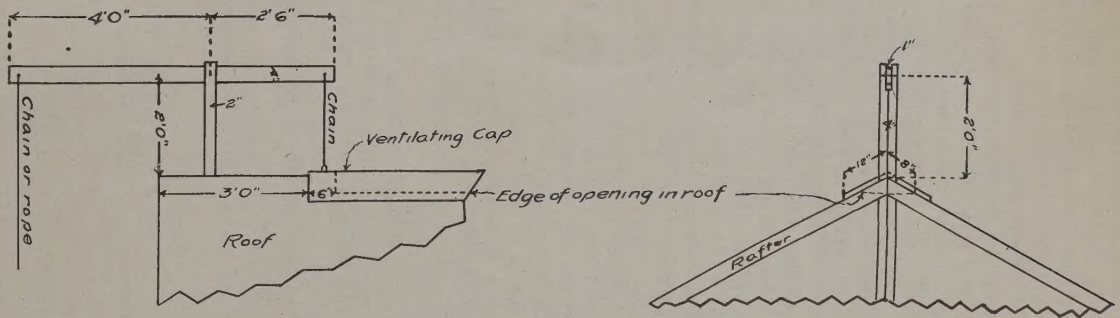

Figure 3—Drawing Showing the Details for Constructing Ventilator for Tobacco Curing Barn

BARN WITH TIGHT ROOF AND VENTILATORS.

1911	Good	¾ Cord	Fair
1911	Cold and Raining	⅞ Cord	Medium
1912	Good	¾ Cord	Good
1912	Good, Cold Nights	⅞ Cord	Good

The tobacco put in the two barns was as near the same both in size and ripeness as could be had. By observing the above table, it will be noticed that the color in the tight barn from the first curing was only "Fair." This was caused by keeping all the ventilators closed too long, about ten hours, when the fires were first started, which held the moisture in the barn too long. This hastened the yellowing and the tobacco got too yellow before any of the moisture was driven off. It is desirable, however, to close up all ventilators for two or three hours when the fires are first started, unless the tobacco has been standing in the barn some time before firing. Particularly is this true if the tobacco does not have enough moisture in it to make it yellow satisfactorily. On the other hand, if the tobacco has too much moisture to begin with, all or a part of the ventilators should be opened when the fires are started, so the excess moisture can be driven off as the tobacco yellows. When this is properly done, there should be little danger of mottling the tobacco when the leaf begins to dry.

It will be noticed by referring to the above table that a saving of 2 1-8 cords of wood was effected during the four curings, about the average number of curings made in each barn a year. The saving in the wood alone will soon pay for the cost of the ventilators, which should not exceed $6.00 per barn, and this saving continues during the life of the barn, which is estimated to be ten years.

If wood is valued at $3.00 per cord, delivered at the barn, which seems to be a conservative valuation, and if the barn is used on an average of four weeks a year for a period of ten years, the saving in fuel alone will amount to $63.75, which will go a long way towards replacing the barn.

Figures 1, 2, 3, 4, cover details regarding the construction of a frame barn 22 feet by 22 feet and 14 feet high, the barn being built very tight, as noted in the drawings. The siding consists of 1-inch boards, a layer of building paper, and the weatherboards on the outside of the paper. For growers who plant considerable acreage in tobacco, a few barns of this size are desirable, especially if the tobacco is harvested by cutting the plant. It is seldom that enough barn room is provided to take care of the crop at the proper time, and it is not unusual for a farmer to lose enough tobacco in the field every year to pay for the building of one or two extra curing barns. A barn of the size indicated will hold from 800 to 1000 sticks of cut tobacco, can be built for but little more than an 18 foot barn, and the fuel consumption will not be over 50

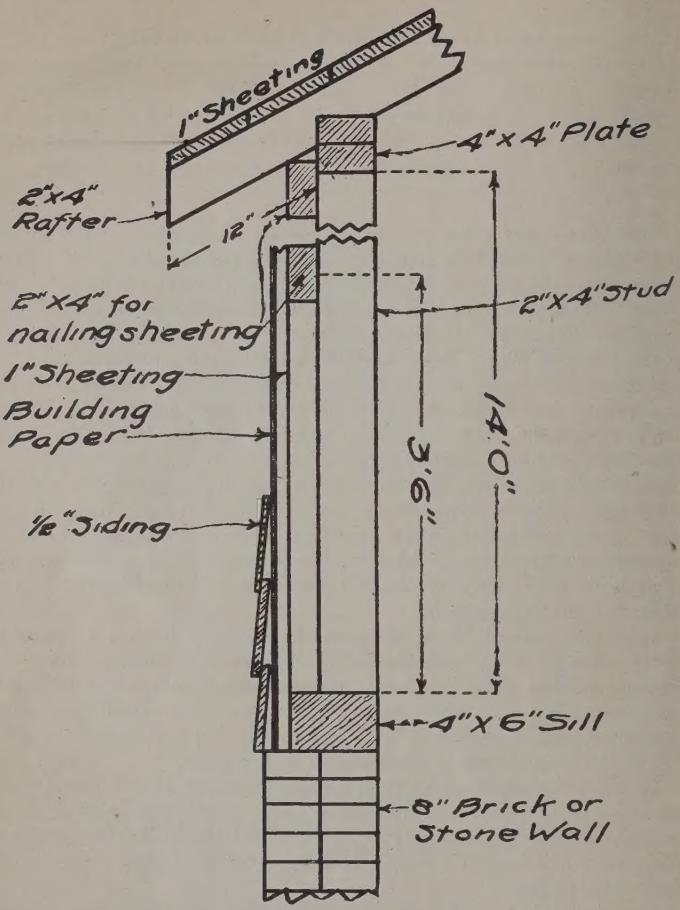

Figure 4—Drawing Showing the Details for Constructing Wall of Tobacco Curing Barn

per cent greater than in a small barn, while it will hold about twice as much tobacco as the small barn. For growers who harvest their tobacco by stripping the leaves as they mature, or priming, the 18-foot barn may be preferable.

BILL OF LUMBER FOR A TOBACCO BARN 22x22 FT. AND 14 FT. HIGH.

	Total.
4 pieces, bottom sills 4x6 in. x 22 ft.	176 feet
44 pieces, studding 2x4 in. x 14 ft.	410 feet
4 pieces, corners 4x4 in. x 14 ft.	74 feet
4 pieces, plates 4x4 in. x 22 ft.	117 feet
24 pieces, rafters 2x4 in. x 14 ft.	224 feet
16 pieces, girders (around barn) 2x4 in. x 22 ft.	234 feet
12 pieces, tier poles, nailed to studding, 2x4 in. x 22 ft.	176 feet
24 pieces, tier poles 4x6 in. x 22 ft.	1056 feet
(24 pine poles, scalped, 4 to 5 inches at little end, are preferable if they can be had at reasonable cost, the cost to determine which shall be used.)	
672 feet 1 in. boards, sheeting for roof	672 feet
1386 feet 1 in. boards, sheeting for sides 14 ft. long	1386 feet
1500 feet building paper.	
1732 feet siding	1732 feet
1 piece board for top ventilator trough 1x12 in. x 18 ft.	18 feet
1 piece board for top ventilator trough 1x13 in. x 18 ft.	19 feet
1 piece board clear of knots for ventilator 2x4 in. x 14 ft.	9 feet
24 pieces V-crimped galvanized iron 2x8 feet.	
24 pieces V-crimped galvanized iron 2x6 feet.	
7 pieces 4 in. terra cotta pipe 2 feet long.	
600 hard brick for furnaces and hearths.	
Door can be made from remnants.	
Rock or brick can be used for the foundation.	

For further information apply to Division of Agronomy, Agricultural Extension Service, West Raleigh, N. C.